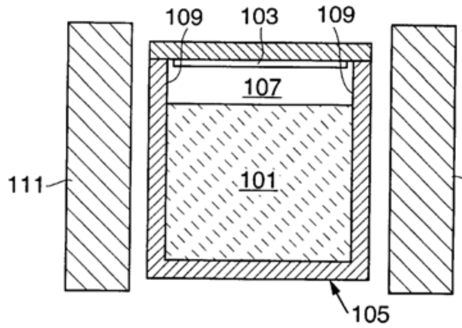
EXHIBIT 1

U.S. Patent No. 6,562,130
DISPUTED TERMS

Term(s)	Fox's Proposed Construction	Fox's Intrinsic Evidence	Fox's Extrinsic Evidence	Cree's Proposed Construction	Cree's Intrinsic Evidence	Cree's Extrinsic Evidence
FOX: Axial region of re-crystallized single crystal silicon carbide/ region of axially re-crystallized silicon carbide **CREE:** "axial" [region] [region of] "re-crystallized" [silicon carbide or single crystal silicon carbide] "an axial region…with a density of dislocations… density of micropipes... density of secondary phase inclusions…"	**Fox proposes that "axial region of re-crystallized single crystal silicon carbide" / "region of axially re-crystallized silicon carbide" be construed as one term.**			**Cree proposes that "axial," "an axial region . . . with [3 densities]," and "recrystallized" be construed separately.**		
	"axial region of re-crystallized single crystal silicon carbide" / "region of axially re-crystallized silicon carbide" **means** "A portion of a boule grown at least 1 mm in thickness in a direction toward the source substantially perpendicular to the seed crystal plane by heating source silicon carbide to form a gaseous phase that condenses onto the seed as substantially a single crystal."	**Specification:** Col. 3: 15-17 ("The present invention provides a method and apparatus for growing low dislocation density single crystal silicon carbide."). Col. 3: 27-34 ("In accordance with the invention, a SiC source and a Sic seed crystal of the desired polytype are co-located within a crucible with the distance separating the source evaporating surface from the growing surface being comparable to the track length of a SiC molecule. The growth zone is define by the substantially parallel surfaces of the source and the seed in combination with the sidewalls of the crucible.). Col. 4: 13-15 ("An axial growth zone 107 is defined by the substantially parallel surfaces of source 101 and seed 103 in combination with sidewalls 109 of crucible 105"). Col. 5:11-14 ("Oven 111 provides an axial temperature gradient from seed 103 to source 101, resulting in the evaporation of the SiC of source 101 and vapor phase crystallization of SiC on the growing surface of seed 103"). Col. 5:22-29 ("If the crystal growing process is run for an extended time period, for example as required to grow an exceptionally large crystal, the gradually increasing thickness of the grown crystal is accompanied by a corresponding decrease in the thickness of source 101. Accordingly, in order to maintain the growth process, a large source must be used, for example, a source rod of SiC that can be continuously fed into growth zone 107.") Col. 5:30-35 ("In the illustrated embodiment, furnace 111 provides the required thermal gradient, either through the use of multiple temperature zones (e.g., one zone for source 101 and one zone for seed crystal 103) or other means. During crystal growth, a stable temperature profile must be maintained throughout the entire growth period.") Col. 5: 46-56 ("By isolating the growth zone from the environment and using a crucible exhibiting a depth-variable composition of Ta-Si-C or Nb-Si-C, the vapor phase in the growth zone shifts from the SiC-C system to the SiC-Si system. Furthermore, as the depth-variable composition of Ta-Si-C or Nb-Si-C remains relatively unchanged for an extended period of time, a stable composition of the vapor phase within growth zone 107 can be achieved, thereby resulting in improvements in both crystal quality and size.") Col. 7:35-38 ("During growth, the evaporated surface of source 101 was separated from the growing surface of seed 103 by approximately 3 to 18 millimeters.") Col. 7:46-48 ("The as-grown single crystals were approximately 10 millimeters thick with diameters ranging between 20 and 75 millimeters.") Col. 7: 60-65 ("The seed polytype reproducibility was 80 percent for a 6H SiC seed growing in direction [0001] Si; 70 percent for a 4H SiC seed growing in direction [0001]C; and 100 percent for a 6H SiC seed growing in a direction lying at an angle of 5 degrees to direction [0001]"). *See also* Abstract. **Claims:**	Expert testimony of Michael Spencer	<u>**Axial:**</u> "axial" [region] **means** "a region extending in a direction perpendicular (i.e., normal) to and from the seed crystal"	<u>**Axial:**</u> Col. 3:27-36 ("In accordance with the invention, a SiC source and a SiC seed crystal of the desired polytype are co-located within a crucible with the distance separating the source evaporating surface from the growing surface being comparable to the track length of a SiC molecule. The growth zone is denned by the substantially parallel surfaces of the source and the seed in combination with the side walls of the crucible. Prior to reaching the growth temperature, the crucible is evacuated and sealed, either directly or through the use of a secondary container housing the crucible.") Col. 4:10-17 ("According to the invention and as illustrated in FIG. 1, a silicon carbide (SiC) source 101 and a SiC seed crystal 103 of the desired polytype (e.g., 4H, 6H, 3C, etc.) are co-located within a crucible 105. An axial growth zone 107 is defined by the substantially parallel surfaces of source 101 and seed 103 in combination with sidewalk 109 of crucible 105. If multiple seed crystals 103 are used as illustrated in FIG. 2, their growth surfaces are located within the same plane and parallel to the evaporating surface of source 101.") Col. 5: 5-40 ("Preferably crucible 105 is capable of being evacuated and sealed, either directly or indirectly through the use of an external container 301 as illustrated in FIG. 3. In one embodiment of the invention, after crucible 105 is loaded with source 101 and seed 103, it is placed within a high temperature oven 111. Oven 111 provides an axial temperature gradient from seed 103 to source 101, resulting in the evaporation of the SiC of source 101 and vapor phase crystallization of SiC on the growing surface of seed 103. In this embodiment crucible 105 (or container 301) is sealed before the final operating temperature is reached, sealing being accomplished using any of a variety of sealing systems (e.g., vacuum welding, graphite or other based sealants, etc.). In an alternate embodiment, crucible 105 (or container 301) is evacuated and hermetically sealed prior to placement within high temperature furnace 111. If the crystal growing process is run for an extended time period, for example as required to grow an exceptionally large crystal, the gradually increasing thickness of the grown crystal is accompanied by a corresponding decrease in the thickness of source 101. Accordingly, in order to maintain the growth process, a large source must be used, for example, a source rod of SiC that can be continuously fed into growth zone 107. In the illustrated embodiment, furnace 111 provides the required thermal gradient, either through the use of multiple temperature zones (e.g., one zone for source 101 and one zone for seed crystal 103) or other means. During crystal growth, a stable temperature profile must be maintained throughout the entire growth period. Preferably this is achieved by altering the relative positions of crucible 105 and furnace 111, for example by moving crucible 105 within furnace 111 at a rate that is substantially equivalent to the growth rate. As previously disclosed, preferably growth zone 107 is evacuated and sealed prior to initiation of the sublimation process. As a result, material losses from source 101 are substantially reduced.	<u>**Axial:**</u> '026 Patent at abstract; Fig 1 (Ref Nos. 101 and 105); 2:10-34; 2:35-63; 2:64-3:5; 3:8-15; 4:42-51; 8:7-17; 8:39-42; PH. The VLSI Handbook. See e.g. at p. 13. USP 6,428,621. See e.g. at col. 8:19-44. USP 7,829,443. See e.g. at col. 8:35-38. USP 7,101,435. See e.g. at col. 2: 29-42; 4: 51-62.

Term(s)	Fox's Proposed Construction	Fox's Intrinsic Evidence	Fox's Extrinsic Evidence	Cree's Proposed Construction	Cree's Intrinsic Evidence	Cree's Extrinsic Evidence
		Claim 1 states: "A silicon carbide material comprising an axial region of recrystallized single crystal silicon carbide …." *See also* claims 2-18. Claim 19 states: "A silicon carbide material, comprising… a region of axially re-crystallized silicon carbide…" *See also* claims 20-26. **Figures**  **FIG. 1** *See also* Figs. 2, 3. **Prosecution History:** The Prosecution History supports this construction.			Additionally, sealing crucible 105, either directly or through the use of separate container 301, prevents foreign impurities from the environment from entering into growth zone 107.") PH.	
				<u>**Recrystallized:**</u> [region of] "re-crystallized" [silicon carbide or single crystal silicon carbide] **means** "region of silicon carbide crystal made into a crystal again."	<u>**Recrystallized:**</u> Col. 1:27-32 ("The methods most commonly used in producing SiC single crystals are sublimation techniques based on the Lely method, this method utilizing vapor-phase crystallization of evaporated solid silicon carbide. (See, for example, U.S. Pat. Ser. Nos. 2,854,364 and 4,866,005).") [Lely U.S. Patent 2,854,364] Col. 2:64-3:9 ("In known sublimation techniques for growing SiC single crystals, the vapor source may be either a pre-synthesized SiC powder of the specified dispersity or a polycrystalline or monocrystalline SiC wafer produced, for example, by the Lely method. Although the use of SiC powder is more economical than the use of wafers, providing a continuous supply of powder into the growth zone, as required to grow large single crystals, is quite complicated. Additionally, SiC powder often includes impurities such as graphite or other dust that are transported to the growth surface along with the SiC molecules. These impurities lead to a high density of micropipes and dislocations in the growing crystal, thus substantially impacting the crystal quality.") Col. 4:25-44 ("In the preferred embodiment, source 101 is comprised of SiC ceramics that are produced from SiC powder that has been sintered at a temperature that permits partial oversublimation of the SiC grains. The sintering process is preferably carried out in an inert gas environment (e.g., argon) within a temperature range of 1500 to 2300° C. In addition to achieving partial binding of the powder, during the sintering process basic background impurities and dust are removed from the powder, thus preventing the dust composition from being transferred from the evaporating surface of source 101 in the vapor phase. The SiC ceramics used for source 101 can also be fabricated by compressing SiC powder. Additionally, during the fabrication of the SiC ceramics, a doping agent can be deliberately introduced. By using SiC ceramics in which the dopant has been uniformly distributed throughout the entire volume, a uniformly doped single crystal can be grown. In another embodiment of the invention, a SiC polycrystal or mono-crystal source is used.") Col.. 5:22-29 ("If the crystal growing process is run for an extended time period, for example as required to grow an exceptionally large crystal, the gradually increasing thickness of the grown crystal is accompanied by a corresponding decrease in the thickness of source 101. Accordingly, in order to maintain the growth process, a large source must be used, for example, a source rod of SiC that can be continuously fed into growth zone 107.") PH Lely U.S. Patent 2,285,364.	Expert Declaration of Michael Dudley. See e.g. at ¶¶ 42-43. <u>**Recrystallized:**</u> **'026 Patent at 6:60-7:5; PH.** *Webster's Third New International Dictionary*, p. 1899 (Merriam-Webster Inc. 1986). Mokhov Article. See e.g. at pp. 320-321. Expert Declaration of Michael Dudley. See e.g. at ¶¶ 34-36. W. F. Knippenberg, *Growth Phenomena in Silicon Carbide*, Phillips Res. Repts. 18, p. 161-274 (1963). See e.g. at chapter 8, p. 248-257. (Supp. Borchers' Decl. Exh. 27). Y. M. Tairov & V. F. Tsvetkov, *General Principles of Growing Large-Size Single Crystals of Various Silicon Carbide Polytypes*, Journal of Crystal Growth 52,146-150 (1981). (Supp. Borchers' Decl. Exh, 24).

Term(s)	Fox's Proposed Construction	Fox's Intrinsic Evidence	Fox's Extrinsic Evidence	Cree's Proposed Construction	Cree's Intrinsic Evidence	Cree's Extrinsic Evidence
				an axial region . . . with [3 densities]: "an axial region..with a density of dislocations…density of micropipes... density of secondary phase inclusions…" **means** " measuring the three referenced densities throughout the entirety of the axial region."	**an axial region . . . with [3 densities]:** Col. 3: 15-27 ("The present invention provides a method and apparatus for growing low dislocation density single crystal silicon carbide. Utilizing the system of the invention, silicon carbide can be grown with a dislocation density of less than 10^4 per square centimeter, preferably less than 10^3 per square centimeter, and more preferably less than 10^2 per square centimeter. The density of micropipes in the as-grown material is less than 10 per square centimeter. The density of secondary phase inclusions is less than 10 per cubic centimeter and preferably less than 1 per cubic centimeter. Depending upon the construction of the crucible, the concentrationof tantalum or niobium impurities is less than 10^{17} per cubic centimeter.") Col. 5:56-67 ("For example, the present invention allows SiC single crystals to be grown with a dislocation density of less than 104 per square centimeter, preferably less than 103 per square centimeter, and more preferably less than 102 per square centimeter. The density of micropipes in the 60 as-grown material is less than 102 per square centimeter. The density of secondary phase inclusions is less than 10 per cubic centimeter and preferably less than 1 per cubic centimeter. Depending upon the construction of the crucible, the concentration of tantalum or niobium impurities is less than 65 1017 per cubic centimeter and typically in the range of 1016 to 1017 per cubic centimeter.") Col. 7: 46-65 ("The as-grown single crystals were approximately 10 millimeters thick with diameters ranging between 20 and 75 millimeters. The density of dislocations was in the range of 10^2 and 10^4 per square centimeter, the density being dependent upon the doping. The density of micropipes was less than 10 per square centimeter while the density of secondary-phase inclusions (i.e., carbon and silicon) was 10 per cubic centimeter. The measured concentration of background impurities was 10^{16} per cubic centimeter for nitrogen; 10^{16} per cubic centimeter for boron; and 10^{16} to 10^{17} per cubic centimeter for tantalum. There was no measurable graphitization of the source or the growing surface during a 10 hour growth procedure which was performed at a temperature of 2000° C. and at a pressure of 10~5 Torr. The seed go polytype reproducibility was 80 percent for a 6H SiC seed growing in direction [0001] Si; 70 percent for a 4H SiC seed growing in direction [0001] C; and 100 percent for a 6H SiC seed growing in a direction lying at an angle of 5 degrees to direction [0001].") PH.	**an axial region . . . with [3 densities]:** Dudley Article. See e.g. at p. 431. Expert Declaration of Michael Dudley. See e.g. ¶¶ 30-33.

Term(s)	Fox's Proposed Construction	Fox's Intrinsic Evidence	Fox's Extrinsic Evidence	Cree's Proposed Construction	Cree's Intrinsic Evidence	Cree's Extrinsic Evidence
FOX:	**Fox proposes that "density of dislocations" be construed as one term.**			**Cree proposes that "density" and "dislocation" be construed separately.**		
Density of dislocations **CREE:** [seed or region…] [having or with] "a . . . density of" [defects, dislocations, micropipes or secondary phase inclusions] "dislocation"	"Density of dislocations" **means** "Concentration of defects where lines of atoms in a crystal structure are displaced."	Abstract ("Utilizing the system, silicon carbide can be grown with a dislocation density of less than 10^ per square centimeter.") Col. 1: 47-49 ("[e]xcessive silicon in the growth zone may result in the formation of defects on the growing surface...") Col. 3: 15-19 ("The present invention provides a method and apparatus for growing low dislocation density single crystal silicon carbide. utilizing the system of the invention, silicon carbide can be grown with a dislocation density of less than 10^4 per square centimeter, preferably less than 10^3 per square centimeter, and more preferably less than 10^2 per square centimeter .") Col. 5: 56-60 ("For example, the present invention allows SiC single crystals to be grown with a dislocation density of less than 10^4 per square centimeter, preferably less than 10^3 per square centimeter, and more preferably less than 10^2 per square centimeter"). Col. 7: 49-51 ("the density of dislocations was in the range of 10^2-10^4 per square centimeter, the density being dependent upon the doping"). **Claims:** Claim 1 states: " …with a density of dislocations of less than 10^4 per square centimeter…" *See also* claims 2-26. **Prosecution History:** The prosecution history supports this construction.	*See* U.S. Patent No. 6,534,026 ("The dislocations in (0001) silicon carbide (SiC) seed crystals are primarily threading and screw dislocations in <0001> crystal direction.") Exhibit 2, Advances in Silicon Carbide Processing and Applications, Chp. 1, (Saddow et al. ed., Artech House, Inc. 2004). Exhibit 3, Wan et al., "A Comparative Study of Micropipe Decoration and Counting in Conductive and Semi-Insulating Silicon Carbide Wafers," J. of Electronic Materials, Vol. 34 no. 10, 2005, at p. 1-2 (2005); Exhibit 4, Wu et al., "Characterization of Dislocations and Micropipes in 4H n+ SiC Substrates," Mat. Sci. Forum Vols. 600-603, p. 333-336 (2009); Exhibit 5, Kuhr et al., "Hexagonal voids and the formation of micropipes during SiC sublimation growth," J. Applied Physics, Vol. 89, No. 8, p. 4625-26 (April 15, 2001); Exhibit 6, Weyher et al., "Defect-selective etching of SiC," phys. stat. sol (a) 202, No. 4, 578-583 (2005). **Testimony of Expert Witnesses:** Expert testimony of Michael Spencer	**A…density of:** [seed or region…] [having or with] "a . . . density of" [defects, dislocations, micropipes or secondary phase inclusions] **means** "a measure of how many defects are present in a quantity of material" (i.e., in the seed or region). For a dislocation, which is a line defect, this is defined as "the total length of dislocation per unit volume", consequently, the units are centimeters per cubic centimeter, which is equivalent to "per square centimeter." For a secondary phase inclusion, which is a volume defect, this is defined "as the number of inclusions per unit volume", consequently, the units are "per cubic centimeter.	**A…density of:** Col. 2:29-36 ("Single crystals obtained by this technique show defects such as secondaryphase inclusions (predominantly, graphite), micropipes with a density of more than 100 per square centimeter, and dislocations of at least 10^4 per square centimeter. These crystals also have relatively high concentrations of residual impurities such as boron, oxygen, etc.") Col. 3:17-26 ("Utilizing the system of the invention, silicon carbide can be grown with a dislocation density of less than 10^4 per square centimeter, preferably less than 10^3 per square centimeter, and more preferably less than 10^2 per square centimeter. The density of micropipes in the as-grown material is less than 10 per square centimeter. The density of secondary phase inclusions is less than 10 per cubic centimeter and preferably less than 1 per cubic centimeter. Depending upon the construction of the crucible, the concentration of tantalum or niobium impurities is less than 10^{17} per cubic centimeter.") Col. 7:47-54 ("The as-grown single crystals were approximately 10 millimeters thick with diameters ranging between 20 and 75 millimeters. The density of dislocations was in the range of 10^2 and 10^4 per square centimeter, the density being dependent upon the doping. The density of micropipes was less than 10 per square centimeter while the density of secondary-phase inclusions (i.e., carbon and silicon) was 10 per cubic centimeter.") PH.	**A…density of:** '026 Patent at abstract; 1:38-49; 2:1-7; PH. http://www.matter.org.uk/glossary/index.asp?dbid=547 The Theory of Transformations in Metals and Alloys (Pergamon Press 2002). See e.g. at pp. 313-314. Introduction to Dislocations (Butterworth Heinemann). See e.g. at p. 20. Dislocations and Plastic Flow in Crystals, (Oxford at the Clarendon Press, 1958). See e.g. at p 18.
				Dislocation: "dislocation" **means** "a crystallographic defect or irregularity within a crystal structure, including but not limited to threading, screw, edge and basal plane dislocations."	**Dislocation:** Col. 3:4-8 ("Additionally, SiC powder often includes impurities such as graphite or other dust that are transported to the growth surface along with the SiC molecules. These impurities lead to a high density of micropipes and dislocations in the growing crystal, thus substantially impacting the crystal quality.") Col. 3:17-26 ("Utilizing the system of the invention, silicon carbide can be grown with a dislocation density of less than 10^4 per square centimeter, preferably less than 10^3 per square centimeter, and more preferably less than 10^2 per square centimeter. The density of micropipes in the as-grown material is less than 10 per square centimeter. The density of secondary phase inclusions is less than 10 per cubic centimeter and preferably less than 1 per cubic centimeter. Depending upon the construction of the crucible, the concentration of tantalum or niobium impurities is less than 10^{17} per cubic centimeter.") Col. 7:47-54 ("The as-grown single crystals were approximately 10 millimeters thick with diameters ranging between 20 and 75 millimeters. The density of dislocations was in the range of 10^2 and 10^4 per square centimeter, the density being dependent upon the doping. The density of micropipes was less than 10 per square centimeter while the density of secondary-phase inclusions (i.e., carbon and silicon) was 10 per cubic centimeter.") PH.	**Dislocation:** '026 Patent at abstract; 4:14-16; 4:60-64; 9:8-11; 10:1-6; PH. *Dictionary of Science and Technology*, p. 558, (Chambers 1999). *Dictionary of Science and Technology*, p. 659, (Academic Press, 1992). Dudley et al, *Silicon Carbide and Related materials – 1999 part 1*. Materials Science Forum Vols. 431-436 (2000). ("Dudley Article"). See e.g. at p. 431. Mokhov et al, *Growth of Silicon Carbide Bulk Crystals by the Sublimation Sandwich Method*, Materials Science and Engineering B46 (1997). ("Mokhov Article"). See e.g. at p. 319. Y.A. Vodakov et al., *Use of Ta-Container for Sublimation Growth and Doping of SiC Bulk Crystals and Epitaxial Layers*, Phys. Stat. Sol. (b), 202, 177-200 (1997). ("Vodakov

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						Article"). See e.g. at Fig. 15. Neudeck, P.G. "*SiC Technology" The VLSI Handbook*, (Boca Raton: CRC Press LLC, 1998). ("The VLSI Handbook"). See e.g. at p. 16.

Term(s)	Fox's Proposed Construction	Fox's Intrinsic Evidence	Fox's Extrinsic Evidence	Cree's Proposed Construction	Cree's Intrinsic Evidence	Cree's Extrinsic Evidence
FOX: Density of micropipes **CREE:** [seed or region…] [having or with] "a . . . density of" [defects, dislocations, micropipes or secondary phase inclusions]	**Fox proposes that "density of micropipes" be construed as one term.**			**Cree proposes that "density" and "micropipe" be construed separately.**		
	"density of micropipes" **means** "Concentration of screw dislocations with empty cores, also called microtubes, micropores, or pores"	**Specification:** Abstract ("Utilizing the system, silicon carbide can be grown with … a micropipe density of less than 10 per square centimeter …") Col.1: 21-22 ("The density of micropipes in the as-grown material is less than 10 per square centimeter.") Col. 5: 61-61 ("The density of micropipes in the as-grown material is less than 10^2 per square centimeter.") Col. 51-52 ("The density of micropipes was less than 10 per square centimeter…") **Claims:** Claim 1 states: " …with a density of micropipes of less than 10 per square centimeter…" *See also* claims 7, 13, and 19. **Prosecution History:** The prosecution history supports this construction.	**Testimony of Expert Witnesses:** Expert testimony of Michael Spencer	**<u>A…density of:</u>** [seed or region…] [having or with] "a . . . density of" [defects, dislocations, micropipes or secondary phase inclusions] **means** "a measure of how many defects are present in a quantity of material" (i.e., in the seed or region).	**<u>A…density of:</u>** Col. 2:29-36 ("Single crystals obtained by this technique show defects such as secondaryphase inclusions (predominantly, graphite), micropipes with a density of more than 100 per square centimeter, and dislocations of at least 10^4 per square centimeter. These crystals also have relatively high concentrations of residual impurities such as boron, oxygen, etc.") Col. 3:17-26 ("Utilizing the system of the invention, silicon carbide can be grown with a dislocation density of less than 10^4 per square centimeter, preferably less than 10^3 per square centimeter, and more preferably less than 10^2 per square centimeter. The density of micropipes in the as-grown material is less than 10 per square centimeter. The density of secondary phase inclusions is less than 10 per cubic centimeter and preferably less than 1 per cubic centimeter. Depending upon the construction of the crucible, the concentration of tantalum or niobium impurities is less than 10^{17} per cubic centimeter.") Col. 7:47-54 ("The as-grown single crystals were approximately 10 millimeters thick with diameters ranging between 20 and 75 millimeters. The density of dislocations was in the range of 10^2 and 10^4 per square centimeter, the density being dependent upon the doping. The density of micropipes was less than 10 per square centimeter while the density of secondary-phase inclusions (i.e., carbon and silicon) was 10 per cubic centimeter.") PH.	**<u>A…density of:</u>** '026 Patent at abstract; 1:38-49; 2:1-7; PH. http://www.matter.org.uk/glossary/index.asp?dbid=547 The Theory of Transformations in Metals and Alloys (Pergamon Press 2002). See e.g. at pp. 313-314. Introduction to Dislocations (Butterworth Heinemann). See e.g. at p. 20. Dislocations and Plastic Flow in Crystals, (Oxford at the Clarendon Press, 1958). See e.g. at p 18.

Term	**Agreed Upon Construction**
Micropipe	screw dislocations with empty cores, also called microtubes, micropores, or pores

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FOX:	**Fox proposes that "density of secondary phase inclusions" be construed as one term.**			**Cree proposes that "density" and "inclusion" be construed separately.**		
Density of secondary phase inclusions **CREE:** [seed or region…] [having or with] "a . . . density of" [defects, dislocations, micropipes or secondary phase inclusions] "secondary phase inclusion"	"density of secondary phase inclusions" **means** "Concentration of polytypes different than the polytype of the bulk silicon carbide crystal material and/or precipitates of silicon, carbon, and tantalum or niobium, and their compounds."	**Specification:** Col. 1: 49-54 ("On the other hand, excessive silicon in the growth zone may result … in the generation of polytypes differing from the seed polytype"). Col. 2: 36-55 ("It was shown that the inclusion of Tantalum during the sublimation growth of monocrystalline SiC resulted in the vapor medium produced in the growth zone being close to SiC-Si system...[u]nfortunately, it was also found that during the early stages of growth, secondary phase inclusions of tantalum or its compounds were formed.) Col. 3: 22-24 ("The density of secondary phase inclusions is less than 10 per cubic centimeter and preferably less than 1 per cubic centimeter.") *See also* col. 5: 61-64. Col. 7: 52-54 ("while the density of secondary-phase inclusions (i.e., carbon and silicon)...") **Claims:** Claim 1 states: " …with a density of secondary phase inclusions of less than 10 per square centimeter…" *See also* claims 2-26. **Prosecution History:** The prosecution history supports this construction.	Exhibit 2, Advances in Silicon Carbide Processing and Applications, Chp. 1, (Saddow et al. ed., Artech House, Inc. 2004). Exhibit 3, Wan et al., "A Comparative Study of Micropipe Decoration and Counting in Conductive and Semi-Insulating Silicon Carbide Wafers," J. of Electronic Materials, Vol. 34 no. 10, 2005, at p. 1-2 (2005); Exhibit 4, Wu et al., "Characterization of Dislocations and Micropipes in 4H n+ SiC Substrates," Mat. Sci. Forum Vols. 600-603, p. 333-336 (2009); Exhibit 5, Kuhr et al., "Hexagonal voids and the formation of micropipes during SiC sublimation growth," J. Applied Physics, Vol. 89, No. 8, p. 4625-26 (April 15, 2001); Exhibit 6, Weyher et al., "Defect-selective etching of SiC," phys. stat. sol (a) 202, No. 4, 578-583 (2005). Exhibit 5, Kuhr et al., "Hexagonal voids and the formation of micropipes during SiC sublimation growth," J. Applied Physics, Vol. 89, No.8, p. 4625-26 (April 15, 2001). **Testimony of Expert Witnesses:** Expert testimony of Michael Spencer	**A…density of:** [seed or region…] [having or with] "a . . . density of" [defects, dislocations, micropipes or secondary phase inclusions] **means** "a measure of how many defects are present in a quantity of material" (i.e., in the seed or region). For a dislocation, which is a line defect, this is defined as "the total length of dislocation per unit volume", consequently, the units are centimeters per cubic centimeter, which is equivalent to "per square centimeter." For a secondary phase inclusion, which is a volume defect, this is defined "as the number of inclusions per unit volume", consequently, the units are "per cubic centimeter.	**A…density of:** Col. 2:29-36 ("Single crystals obtained by this technique show defects such as secondaryphase inclusions (predominantly, graphite), micropipes with a density of more than 100 per square centimeter, and dislocations of at least 10^4 per square centimeter. These crystals also have relatively high concentrations of residual impurities such as boron, oxygen, etc.") Col. 3:17-26 ("Utilizing the system of the invention, silicon carbide can be grown with a dislocation density of less than 10^4 per square centimeter, preferably less than 10^3 per square centimeter, and more preferably less than 10^2 per square centimeter. The density of micropipes in the as-grown material is less than 10 per square centimeter. The density of secondary phase inclusions is less than 10 per cubic centimeter and preferably less than 1 per cubic centimeter. Depending upon the construction of the crucible, the concentration of tantalum or niobium impurities is less than 10^{17} per cubic centimeter.") Col. 7:47-54 ("The as-grown single crystals were approximately 10 millimeters thick with diameters ranging between 20 and 75 millimeters. The density of dislocations was in the range of 10^2 and 10^4 per square centimeter, the density being dependent upon the doping. The density of micropipes was less than 10 per square centimeter while the density of secondary-phase inclusions (i.e., carbon and silicon) was 10 per cubic centimeter.") PH.	**A…density of:** '026 Patent at abstract; 1:38-49; 2:1-7; PH. http://www.matter.org.uk/glossary/index.asp?dbid=547 The Theory of Transformations in Metals and Alloys (Pergamon Press 2002). See e.g. at pp. 313-314. Introduction to Dislocations (Butterworth Heinemann). See e.g. at p. 20. Dislocations and Plastic Flow in Crystals, (Oxford at the Clarendon Press, 1958). See e.g. at p 18.
				Secondary Phase Inclusion: An inclusion is a "feature in a material not identical to the material matrix." In the case of the Fox patents and silicon carbide having a primary phase, a "secondary phase inclusion" is "an inclusion of material other than the primary phase such as other polytypes of silicon carbide, inclusions of carbon, silicon, tantalum or their compounds."	**Secondary Phase Inclusion:** Col. 1:47-57 ("Excessive carbon in the growth zone leads to source graphitization, crystal quality degradation, and eventually the discontinuation of the growth process. On the other hand, excessive silicon in the growth zone may result both in the formation of defects on the growing surface of the SiC crystal, primarily due to the precipitation of excess silicon drops, and in the generation of polytypes differing from the seed polytype. Accordingly, it has been established that the best characteristics for the as-grown SiC single crystal are achieved when the vapor composition in the growth zone is shifted the towards the vapor phase corresponding to the SiC—Si system.") Col. 2:41 ("inclusion of tantalum"). Col. 2: 47-48 ("secondary phase of tantalum or its compounds were formed") Col. 3:17-26 ("Utilizing the system of the invention, silicon carbide can be grown with a dislocation density of less than 10^4 per square centimeter, preferably less than 10^3 per square centimeter, and more preferably less than 10^2 per square centimeter. The density of micropipes in the as-grown material is less than 10 per square centimeter. The density of secondary phase inclusions is less than 10 per cubic centimeter and preferably less than 1 per cubic centimeter. Depending upon the construction of the crucible, the concentration of tantalum or niobium impurities is less than 10^{17} per cubic centimeter.") Col. 7:53-54 ("while the density of secondary phase inclusions (i.e., carbon and silicon")	**Secondary Phase Inclusion:** *Dictionary of Mechanical Engineering*, p. 180 (Butterworths, 1985). *Dictionary of Scientific and Technical Terms*, p. 947(McGraw-Hill Book Company 1989). ("McGraw Dictionary"). Mokhov et al, *SiC Growth in Tantalum Containers by Sublimation Sandwich Method, Growth of Silicon Carbide Bulk Crystals by the Sublimation Sandwich Method*, Journal of Crystal Growth, 181 (1997), pp. 254-258. See e.g. at abstract and p. 256. P.G. Baranov, et al., *Use of Sublimation Sandwich Method for Growth of Good Quality Monocrystals of the Most Promising Wide-Band-Gap Semiconductors SiC and GaN with Controllable Properties*, Ioffe Institute Prize Winners, 1995. ("Baranov Article"). See e.g. at p. 25

Term(s)	Fox's Proposed Construction	Fox's Intrinsic Evidence	Fox's Extrinsic Evidence	Cree's Proposed Construction	Cree's Intrinsic Evidence	Cree's Extrinsic Evidence
					Col. 8:35 ("The silicon carbide material of claim 1, wherein said density of secondary phase inclusions is less than 1 per cubic centimeter.") PH.	Mokhov Article. See e.g. at p. 321. Vodakov Article. See e.g. at 195, Figs. 12, 13 and 14.

Term(s)	**Agreed Upon Construction**
Seed crystals	The parties have agreed upon the following construction for "seed crystal": crystal on which another crystal is grown